

REMARKSA. Background

Claims 5-10 were pending in the application at the time of the Office Action. The Office Action objected to the specification. Claims 5-10 were rejected as being anticipated and/or obvious over cited art. By this response applicant has amended the specification so as to address the formal issues. Applicant has also amended claims 5-10 and added new claims 11 and 12. As such, claims 5-12 are presented for the Examiner's consideration in light of the following remarks.

B. Proposed Amendments

The specification has been amended herein to remedy various informalities. Claims 5-10 have been amended herein to remedy various informalities and to further clarify the claimed inventions. Claim 5 has also been amended to add the limitation that "an Al_2O_3 layer [is] provided on the sapphire substrate." This amendment is supported in the specification as originally filed. Claims 11 and 12 have also been added and are supported in the specification as originally filed. In view of the foregoing discussion, applicant submits that the amendments to the specification and claims do not introduce new matter and entry thereof is respectfully requested.

C. Rejection on the Merits

i. Objections

Page 2 of the Office Action objects to the disclosure because of various informalities. Applicant has herein amended the specification to remedy the objection. As a result, Applicant respectfully submits that the objection to the disclosure should be withdrawn.

Page 2 of the Office Action objects to claim 5 because of an informality. Applicant has herein amended claim 5 to remedy the objection. As a result, Applicant respectfully submits that the objection to claim 5 should be withdrawn.

ii. Indefiniteness Rejection

Page 3 of the Office Action rejects claims 5 and 6 under 35 USC § 112, second paragraph, as being indefinite. Specifically, the Office Action asserts that the recitation "a layer including N, O, and Al as separately provided" is indefinite because "[i]t is unclear whether the claim requires N, O, and Al to be provided separately or the layer to be provided separately." Applicant has herein amended claim 5 to remedy the rejection. As a result, Applicant respectfully submits that the rejection to claim 5 should be withdrawn.

iii. Anticipation Rejection

Page 4 of the Office Action rejects claim 5 under 35 USC § 102(e) as being anticipated by U.S. Patent No. 6,744,076 to Fukuyama et al. In view of amendments made herein to claim 5, Applicant respectfully traverses this rejection.

As asserted by the Office Action, Fukuyama discloses that an AlON layer and an AlN film are formed in that order directly on a sapphire substrate. This is accomplished by nitriding

the sapphire substrate. More particularly, the AlON layer is formed directly on the sapphire substrate and the AlN film is formed on this AlON layer by nitriding the substrate. See col. 4, lines 34-37. Fukuyama does not disclose any layer between the AlON layer and the sapphire substrate or any layer besides the AlON layer being formed directly on the sapphire substrate.

Accordingly, because the only layer Fukuyama discloses as being disposed on the sapphire substrate is an AlON layer, Fukuyama does not teach or suggest "an Al₂O₃ layer provided on the sapphire substrate," as recited in amended claim 5. Thus, Applicant respectfully submits that the anticipation rejection of claim 5 should be withdrawn.

iii. Obviousness Rejection

Pages 5 and 6 of the Office Action reject claims 5-10 under 35 USC § 103(a) as being obvious over U.S. Patent No. 6,362,515 to Hayakawa in view of what the examiner considers to be obvious to those skilled in the art. Specifically, the Office Action asserts that Hayakawa discloses multiple films, including Al₂O₃, AlN, and AlON, "stacked in any combination on a substrate, which may be a sapphire substrate." The Office Action further asserts that "[b]ecause Hayakawa discloses all of the films claimed and discloses that they may be arranged in any manner, it would have been obvious ... to create the claimed structure." Applicant respectfully traverses this rejection.

Applicant respectfully notes at the outset that in order to establish a *prima facie* case of obviousness, it is the burden of the Examiner to demonstrate, among other things, that there is "some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." MPEP § 2143. In discussing this requirement, the MPEP states that "[i]f proposed

modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." MPEP 2143.01(v). Thus, when such is the case, the Examiner has failed to establish a *prima facie* case and the corresponding obviousness rejection must be withdrawn.

As perhaps best shown in Figure 1B, Hayakawa discloses stripe structures having a GaN buffer layer 12, a first GaN layer 13 and a SiO₂ layer 14. Grooves are formed between the stripe structures and a "first preventing means" and "second preventing means" are formed on the upper surfaces of the stripe structures and the grooves, respectively. See col. 3, lines 22-29. In the bottoms of the grooves, the second preventing means is formed on a sapphire substrate 11 and can be realized by a dielectric film 18. See Figure 1B and col. 3, lines 61-63. Although not shown in any of the figures, Hayakawa asserts that, along with other possible film combinations, the dielectric film 18 may be made of Al₂O₃, AlON or AlN. Alternatively, Hayakawa asserts that the dielectric film 18 may be a multilayer film made of any combination of the above films. See col. 4, lines 10-17.

The purpose given in Hayakawa for the "second preventing means" is "for preventing crystal growth of a GaN layer in the vertical up direction from the ... bottom [of the grooves]." Col. 3 lines 26-29. That is, in Hayakawa, vertical crystal growth can be effectively prevented by the dielectric film 18. See column 3 lines 64 to 67. Because the vertical crystal growth is prevented by the dielectric film 18, a lateral crystal growth of a second GaN layer 16 from the exposed side walls of the stripe structure of the first GaN layer 13 can be promoted. See col. 4, lines 1 to 9.

In other words, Hayakawa discloses that the dielectric film 18 is a mask for the vertical crystal growth of the GaN layer and is thus used to prevent crystal growth.

In contrast, the present inventions of claims 5, 7 and 9 are all directed to forming a nitride semiconductor on a substrate for the growth of a nitride semiconductor, as illustrated in the specification at least at page 11, lines 5 to 7; that is, one of the purposes of the present inventions recited in claims 5, 7, and 9 is to promote vertical crystal growth. As such, the substrate recited in each of claims 5, 7, and 9, including the layers as recited in each claim, necessarily promotes vertical crystal growth.

Therefore, if the layers as recited in any of claims 5, 7, or 9 were applied as the dielectric film in Hayakawa, i.e., if in Hayakawa, an Al_2O_3 layer was formed on the sapphire substrate and a second layer as defined in claims 5 or 7 (or a second and third layer as defined in claim 9) was formed on the first buffer layer when the second GaN layer was grown on the dielectric film, vertical crystal growth would be promoted and the second GaN layer would grow vertically from the dielectric film. That is, the vertical crystal growth would be promoted on the dielectric film, not prevented. This is in direct contrast to the stated purpose of the dielectric film in Hayakawa, that of "preventing crystal growth ... in the vertical up direction." Thus, one of ordinary skill in the art would not be motivated to use the layer structure as recited in each of claims 5, 7, or 9, as this would teach away from the purpose of the dielectric film in Hayakawa and would render Hayakawa unsatisfactory for its intended purpose.

In view of the foregoing, applicant respectfully submits that there is no motivation to modify the teachings of the Hayakawa in the manner asserted by the Office Action. As such, applicant respectfully requests that the obviousness rejection with respect to claims 5, 7, and 9 be withdrawn. Claims 6, 8, and 10 depend from claims 5, 7, and 9, respectively, and thus incorporate the limitations thereof. As such, applicant submits that claims 6, 8, and 10 are distinguished over Hayakawa for at least the same reasons as discussed above with regard to

claims 5, 7, and 9. Accordingly, Applicant respectfully requests that the obviousness rejection with respect to claims 6, 8, and 10 also be withdrawn.

iv. New Claims

Applicant submits that new claims 11 and 12 are allowable because, similar to the discussion set forth above, the cited art does not disclose or suggest all of the claim limitations contained therein.

No other objections or rejections are set forth in the Office Action.

D. Conclusion

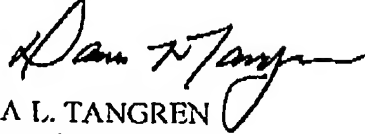
Applicant notes that this response does not discuss every reason why the claims of the present application are distinguished over the cited art. Most notably, applicant submits that many if not all of the dependent claims are independently distinguishable over the cited art. Applicant has merely submitted those arguments which it considers sufficient to clearly distinguish the claims over the cited art.

In view of the foregoing, applicant respectfully requests the Examiner's reconsideration and allowance of claims 5-12 as amended and presented herein.

In the event there remains any impediment to allowance of the claims which could be clarified in a telephonic interview, the Examiner is respectfully requested to initiate such an interview with the undersigned.

Dated this 18th day of April 2006.

Respectfully submitted,



DANA L. TANGREN
Attorney for Applicant
Registration No. 37,246
Customer No. 022913
Telephone No. 801.533.9800

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